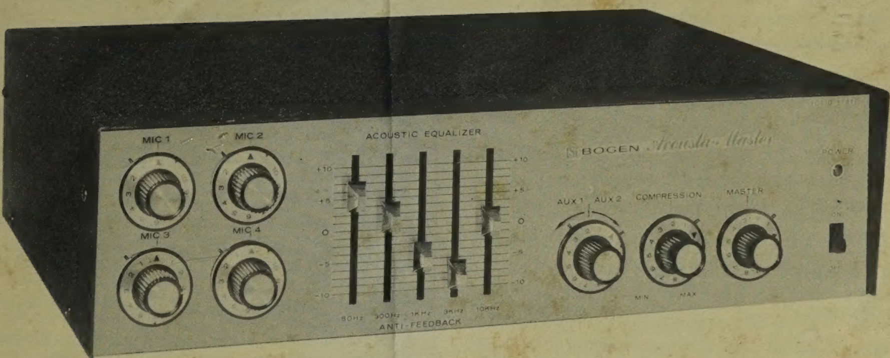
BOGEN

ACOUSTA-MASTER AMPLIFIER

MODELS CT30, CT60, CT100
CTL30, CTL60, CTL100



INSTALLATION AND OPERATING MANUAL

Read Carefully Before Operating Equipment

DESCRIPTION

The Bogen Acousta-Master CT series public address amplifiers are silicon transistor preamp-mixer-amplifier units designed for high-quality sound systems. The Model CT30 is rated at 30 watts output, the CT60 at 60 watts, and the CT100 at 100 watts.

All CT models provide four high-impedance microphone inputs, each convertible for use with low-impedance microphones by means of appropriate plug-in transformer accessories. Two of the microphone inputs and one auxiliary input may be remotely controlled or overridden for special announcements over another microphone channel. There are also auxiliary inputs with fader control and a bridging input.

The Bogen Acousta-Master CTL line of amplifiers is identical with the CT series, except that these amplifiers are furnished with a 200-ohm transformer in each microphone channel for balanced low-impedance MIC inputs.

All Acousta-Master amplifiers feature the Bogen built-in acoustic equalizer filter circuit, which provides a means of boosting or attenuating any of five selected frequencies to suit individual room acoustics.

Another novel feature of these amplifiers is the electronic limiter circuit, which provides uniform output regardless of wide variations in the input level. With this capability, all paging calls can be transmitted with the same volume and clarity.

Additional information about the acoustic equalizer and the limiter compressor and instructions for using them properly in a sound system appear on page 3 of this manual.

An output terminal strip at the rear of the amplifier provides standard 4, 8 and 16-ohm speaker taps, as well as connections for 25-volt balanced and 70-volt lines. There is also a bridging output for feeding a tape recorder or booster amplifier.

Bogen accessories provide the amplifier with telephone line input and output connections, remote volume control, and channel over-ride facilities. Further information is contained in the Accessories section on page 6.

The amplifier operates from a 105-125 volt, 50/60 cycle line. A three-prong line cord provides automatic grounding when connected to a three-wire power outlet. The power line is protected by a circuit breaker, and the output transistors by a thermal overload device, which shuts off the unit when the temperature of lhe heat sink rises excessively.

TECHNICAL SPECIFICATIONS

	CT30/CTL30	CT60/CTL60	CT100/CTL100
POWER OUTPUT:	30 W at 1 kHz at less than 2% distortion.	60 W at 1 kHz at less than 2% distortion.	100 W at 1 kHz at less than 2% distortion.
POWER RESPONSE:	30 W ±2 db, 60 Hz, —12 kHz at 5% distortion.	60 W ±2 db, 60 Hz, —12 kHz at 5% distortion.	100 W ±2 db, 60 Hz, —12 kHz at 5% distortion.
FREQUENCY RESPONSE:	±1.5 db from 60 Hz to 12 kHz.	±1.5 db from 60 Hz to 12 kHz.	±1.5 db from 60 Hz to 12 kHz.
GAIN:	112 db.	115 db.	118 db.
REGULATION:	2 db.	2 db.	2 db.
POWER REQUIREMENTS:	120 V, 50/60 Hz, 0.86 A, 96 W.	120 V, 50/60 Hz, 1.6 A, 170 W.	120 V, 50/60 Hz, 2.9 A, 300 W.
SEMI-CONDUCTORS:	18 silicon transistors, 1 Zener diode, 7 silicon diodes.	20 silicon transistors, 1 Zener diode, 7 silicon diodes.	22 silicon transistors, 1 Zener diode, 7 silicon diodes.
DIMENSIONS:	16⅜″ W x 12¾″ D x 4¼″ H.	16⅜″ W x 13¾″ D x 4¼″ H.	16⅜″ W x 13¾″ D x 4¼″ H.
WEIGHT:	19 lbs.	22 lbs.	26 lbs.
LINE FUSING:	Resettable Circuit Breaker. 1.25A.	Resettable Circuit Breaker. 2.5A.	Resettable Circuit Breaker. 4A.
SENSITIVITY:	HI-Z MIC, 3mV; LO-Z MIC, 0.3 mV; Bridging Input, 30 mV; AUX, 0.3 V.		
OUTPUT LEVELS:	Bridging, 30 mV; Tape, 0.68 V.		
HUM & NOISE:	MIC, 60 db below rated output for both low and high impedance; AUX, 70 db below rated output; Fundamental, 80 db below rated output.		
INPUTS:	4 HI-Z MIC inputs, each convertible to LO-Z MIC; 2 AUX inputs with fader control; Bridging input; 500/600 Ω telephone line with optional WMT-1 accessory; 2 inputs for remote volume control.		
OUTPUTS:	4, 8, 16-ohm speaker taps; 25-volt CT and 70 V balanced lines. Tape, booster and bridging outputs; 500/600 Ω telephone line output with WMT-1 optional accessory.		
CONTROLS & INDICATORS:	4 MIC Volume; AUX 1/AUX 2—fader; MASTER VOLUME; 5 Equalizer Filter Slide Controls; 1 Limiter; 1 Power Switch; 1 Indicator Lamp.		
FILTER CONTROL ACTION:	±10 db variation at the following frequencies: 80, 300, 1 kHz, 5 kHz, 10 kHz.		

OPERATION

The model CT and CTL amplifiers are equipped with acoustic equalization and compression control. To obtain the maximum benefit from the use of these controls, follow the instructions.

ACOUSTIC EQUALIZER

The Acoustic Equalizer permits you to "tune" the amplifier to the room in which the sound system is used, so that the amplifier will operate at a substantially higher output before acoustic feedback occurs. Five slide controls, located on the front panel, boost or attenuate the output at five selected frequencies — 80 Hz, 300 Hz, 1 kHz, 3 kHz, and 10 kHz. Varying room acoustics or microphone placement may cause feedback or howling at or near some of these frequencies. If so, feedback can be greatly attenuated by setting the slide control for that particular frequency as described below.

ROOM EQUALIZATION: With speakers connected and one microphone in normal operating location, turn amplifier on and proceed as follows:

1. Connect microphone to appropriate MIC input of amplifier.
2. Set all five acoustic filter controls to zero (center position).
3. Turn MIC volume control half-way up and the three other MIC volume controls to zero.
4. Advance MASTER volume control slowly until feedback is heard.
5. Note the frequency of the feedback tone, and determine which of the five selected frequencies on the Acoustic Equalizer is closest to it.
6. Move the filter control marked for this frequency downward slowly until feedback disappears.
7. If feedback does not disappear, try moving this filter down along with the adjacent filter until the feedback stops.
8. Advance MASTER control again and note whether feedback is heard at another frequency.
9. Adjust the appropriate filter controls until this feedback disappears.
10. Continue to advance MASTER control and adjust individual filter controls until MASTER control is at maximum setting, consistent with a stable output without feedback at any frequency.
11. More attenuation at a particular frequency can be obtained by boosting adjacent frequency control to maximum.
12. Note and record the settings of the individual filter controls and the MASTER control. These settings are generally applicable to all four MIC input channels, if the microphone remains in the same position.
13. If the position of the microphone is changed, some adjustment in the feedback controls may be necessary.

NOTE

If feedback is not a problem, the controls should be used to improve quality and intelligibility of the paging system. In most cases, the 10 kHz and 80 Hz controls should be placed in minimum position while the 400 Hz, 1 kHz and 3 kHz should be moved toward maximum for improved presence. Each system, depending on the speakers used and room acoustics, will require some experimentation with the controls for optimum results.

COMPRESSOR LIMITER

The COMPRESSION control is used to provide relatively uniform output from the amplifier regardless of variations in the input levels. This is particularly important in speech applications, where a microphone may be used by a number of people with varying voices and microphone techniques. It is also useful for musical programs, particularly when handling background music.

The COMPRESSION control is turned clockwise to the higher numbers to reduce the output range for a given input. Turn the control counter-clockwise to lower numbers to increase the range. To remove compression and restore the normal full range of the amplifier, the control is turned fully counter-clockwise to zero.

To determine the optium setting of the COMPRESSION control for speech applications proceed as indicated below. For music, the setting will generally be lower and more extended than for speech.

Set the COMPRESSION control fully counter-clockwise to zero position. Set the MASTER volume control to the highest level likely to be required. Use a level setting such as will permit you to pick up clearly spoken inputs in a low voice at a distance of three feet on axis from the microphone. However, do not set the volume level so high as to produce feedback or howling.

Then speaking in a loud voice directly into the microphone, turn the COMPRESSION control clockwise to the point where the output of the amplifier is reduced to a normal level. The MASTER control can be used to vary the over-all volume without upsetting the COMPRESSION adjustments.

OTHER CONTROLS

All other controls are located on the front panel, and the function of each is described below.

MIC VOLUME: The four individual MIC volume controls are used to adjust the level of each microphone input channel. The control is turned clockwise (to the higher numbers) to increase the volume and counter-clockwise to reduce it.

AUX VOLUME: This control serves a two-fold purpose. It selects either of the two auxiliary inputs and it controls the volume of the selected auxiliary input. To select the AUX 1 input, rotate the control counterclockwise past the center position. Turning this control counterclockwise to the higher numbers increases the AUX 1 volume. To select the AUX 2 input, rotate the control clockwise past the center position. Turn the control more clockwise to increase the AUX 2 volume.

If the auxiliary input is not to be used, set the control to the center position. The center position is indicated when the triangle on the control knob coincides with the vertical line between the AUX 1 and AUX 2 designations.

MASTER: This control is used to regulate the over-all volume of the amplifier, which may include the mixed output of two or more input channels. To set this control, rotate it to maximum clockwise position. Then set the individual MIC and AUX controls to the highest level likely to be used and consistent with the operation of the limiter compressor. Adjust the MASTER control to the desired listening level for the mixed output.

RESET MARKERS: Each of the above volume controls has a reset marker on the skirt of the knob. This marker is used to log a particular setting. To do so, first adjust the volume control to the desired levels. Slide the reset marker to coincide with the midpoint mark on the front panel. The individual knob can now be returned to zero or any other point, allowing instant resetting to the predetermined level.

POWER: This switch applies power to the amplifier. It will also turn on any associated equipment which may be connected to the auxiliary power receptacle on the rear panel. The POWER indicator lamp will go on to show that power has been applied to the unit.

INSTALLATION

UNPACKING

The amplifier was carefully checked before leaving factory. Inspect shipping container and unit carefully for indications of improper handling. If the unit has been damaged, make an immediate claim to distributor from whom it was purchased. If the amplifier was shipped to you, notify transportation company without delay and place your claim.

POWER AND GROUNDING

The amplifier is furnished with an ac line cord terminated in a three-prong plug. The line cord should be plugged into a three-wire grounded outlet providing a nominal 120-volt, 50-60 cycle power source. This will ground the amplifier as well as supply power to it.

It is advisable to ground the amplifier. Therefore, if a three-wire outlet is not available, an adapter such as Leviton No. 5017 should be used to convert a standard two-wire outlet for use with three-wire plugs. The adapter is provided with a grounding pigtail which should be connected to the screw holding the wall plate to the receptacle.

In some areas, the wall plate screw is not grounded. In this case it will be necessary to connect a grounding wire from the GND terminal on the rear chassis of the amplifier to a water or steam pipe.

AUXILIARY POWER

The auxiliary power receptacle located, on the rear chassis of amplifier, is a three-wire grounded outlet, which can supply power to accessory or assosiated equipment in the sound system. Be sure that the auxiliary component does not draw more than 250 watts. The power switch on the front panel of the amplifier controls this receptacle and can be used to turn the auxiliary unit on and off.

Associated equipment connected to the auxiliary receptacle with a three-prong line cord will be grounded, providing the amplifier line cord has been properly grounded as described above. Otherwise, it may be necessary to ground the auxiliary equipment.

CAUTION

Use the on-off switch on the phonograph for turning off a record player connected to the auxiliary receptacle. Do not use the amplifier power switch to stop the record player as this may cause flats to develop on the idler wheel of the phonograph.

INPUT CONNECTIONS

HIGH-IMPEDANCE MICROPHONES: High-impedance microphones (approx. 47K ohms) may be connected directly to any of the four MIC input sockets of the CT30, CT60 or CT100 amplifiers. The microphone lead should be a single-conductor shielded cable under 35 feet in length and terminating in an XLR-311C Conductor (Bogen Part No. 85-0124-01) as shown in figure 1. For connections to CTL30, CTL60 or CTL100, remove plug-in transformer accessories and reset pins

in transformer socket, as described under ACCESSORIES on page 6.

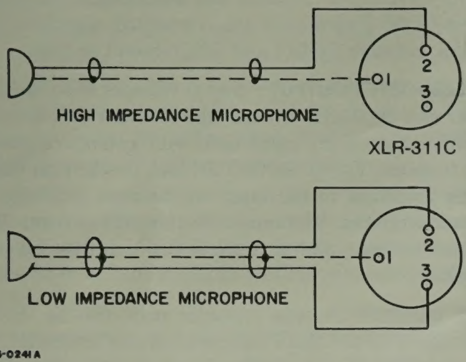


Figure 1 — Connecting Microphone Cable Connector

LOW-IMPEDANCE MICROPHONES: Low-impedance microphones rated at 200 ohms may be connected directly to any one of the four MIC inputs of the CTL30, CTL60 or CTL100 amplifiers. Use a two-conductor shielded cable for the microphone lead, which should be terminated in an XLR-311C connector (Bogen Part No. 85-0124-01) as shown in figure 1. For connecting other low-impedance microphones, change transformer accessories in each required MIC channel, as described on page 6.

AUXILIARY INPUTS: Two auxiliary inputs are provided for high-level, high impedance inputs. These may be used to connect a radio tuner, tape recorder, or record player utilizing a ceramic cartridge. An input signal of 0.3 volts is required to obtain full output from the amplifier.

Use single-conductor shielded cable terminated in an RCA phono jack for connecting auxiliary component. If hum is experienced after making connections, run a ground wire between the chassis of the auxiliary unit and the GND terminal on the amplifier.

BRIDGING: The amplifier may be bridged to a second Bogen CT amplifier to double the number of inputs and to provide twice the power output in a sound system. For bridging, connect a single-conductor shielded cable, terminated in an RCA phone plug at each end, between the rear panel BRIDGING receptacles of the two amplifiers. Any input to either amplifier will then be fed through and available at the output of both amplifiers.

A Bogen CTM preamplifier may also be bridged to any CT amplifier to increase the number of inputs in a system. This is done by connecting a single-conductor shielded cable, terminated in phone plugs at either end, between the BRIDGING jack on the preamp and the one on the amplifier. As a result, all inputs to either the pre-amp or amplifier will be fed through and available at the amplifier output.

NOTE

When two amplifiers are bridged together, any adjustment of the MASTER, COMPRESSION or Acoutic Equalizer controls in one amplifier will not affect the output of the other amplifier.

OUTPUT CONNECTIONS

For installations where speaker will be connected permanently, output connections are available on the terminal strip at the rear of the amplifier for individual speakers rated at 4, 8 and 16 ohms. Constant-voltage line outputs at 25 and 70 volts are also available at the terminal strip for multiple speaker systems. Connec-

TABLE I — OUTPUT CONNECTIONS

Speaker Line	Terminal Connections	Other Connections
4Ω Unbalanced 4Ω Balanced	* 4Ω and COM 1 * 4Ω and COM 1	Close link between COM 1 and GND Open link between COM 1 and GND
8Ω Unbalanced 8Ω Balanced	8Ω and COM 1 8Ω and COM 1	Close link between COM 1 and GND Open link between COM 1 and GND
16Ω Unbalanced 16Ω Balanced 16Ω Balanced, CT gnd.	16Ω and COM 1 16Ω and COM 1 16Ω and COM 1	Close link between COM 1 and GND Open link between COM 1 and GND Connect jumper between 4Ω and GND
25V Unbalanced 25V Balanced 25 Balanced, CT gnd.	25V and COM 1 25V and COM 1 25V and COM 1	Close link between COM 1 and GND Open link between COM 1 and GND Connect jumper between 25VCT and GND
70V Unbalanced 70V Balanced	70V and COM 2 70V and COM 2	Connect jumper between COM 2 and GND No jumper between COM 2 and GND

*Not available on CT60 amplifier.

MAINTENANCE

> **WARNING**
>
> *Some servicing procedures require removal of the cover of the amplifier, as described previously. It should be noted that there are no user servicable parts inside the amplifier enclosure. No interior servicing should be attempted except by a trained technician.*

BOGEN SERVICE

We are interested in your Bogen amplifier for as long as you have it. If trouble ever develops with your unit, please do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Division, Lear Siegler, Inc., P.O. Box 500, Paramus, New Jersey 07652.

When communicating with us, give the model number and serial number of your unit. Describe the difficulty encountered and the effects each operating control has upon the symptoms of trouble. Include details on electrical connections to associated equipment, and list such equipment. When we receive this information, we will send you service information if the trouble appears to be simple. If the trouble requires servicing, we shall send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repairs.

When shipping your unit, pack the amplifier well, using the original shipping carton, or a similar container and filler material, to prevent damage in transit. Send the unit, fully insured and prepaid, via railway express. Do not ship via parcel post unless so instructed. The unit will be promptly repaired and returned to you prepaid.

CIRCUIT BREAKER AND THERMAL OVERLOAD

The power line is protected by a circuit breaker, which shuts off the power and turns off the POWER indicator in case of overload. The breaker is reset by pressing in the red reset button located on the rear panel. If the amplifier shuts off again after resetting the breaker, make no further attempt to operate the equipment. Call a service man to locate the cause of the trouble.

The output transistors are protected by a thermal overload device, which shuts off the unit when the temperature of the heat unit rises excessively. When the unit is shut off by the thermal overload device, the POWER indicator on the front panel remains on. Check the output transistors and replace defective transistors as indicated below.

TRANSISTOR REPLACEMENT

Transistors and semiconductor diodes do not ordinarily require routine testing. When the amplifier does not perform properly and it is suspected that a transistor or diode is at fault, only a qualified technician should test them.

However, if previous tests by a technician indicate that a transistor might be faulty, it must be removed from the circuit for checking. The plug-in transistors, of course, can easily be replaced. When replacing power transistors, use Dow Corning No. 340 Compound Silicon Grease (or equivalent). Clean off all foreign matter from heat sink, insulator and transistor before brushing the compound on these surfaces. To insure proper thermal contact, fasten the plug-in transistors securely.

PRINTED CIRCUIT REPAIR

When testing or replacing components on the printed circuit, take care not to damage the board by application of excessive heat or pressure. A 40-watt pencil iron normally is sufficient to unsolder component parts. If component leads are cut, always pull them through from the top of the board — never pull from the printed side. Do not insert the leads of replacement components into the board without first clearing the holes. This is done by heating the solder and inserting a pick from the underside of the board.

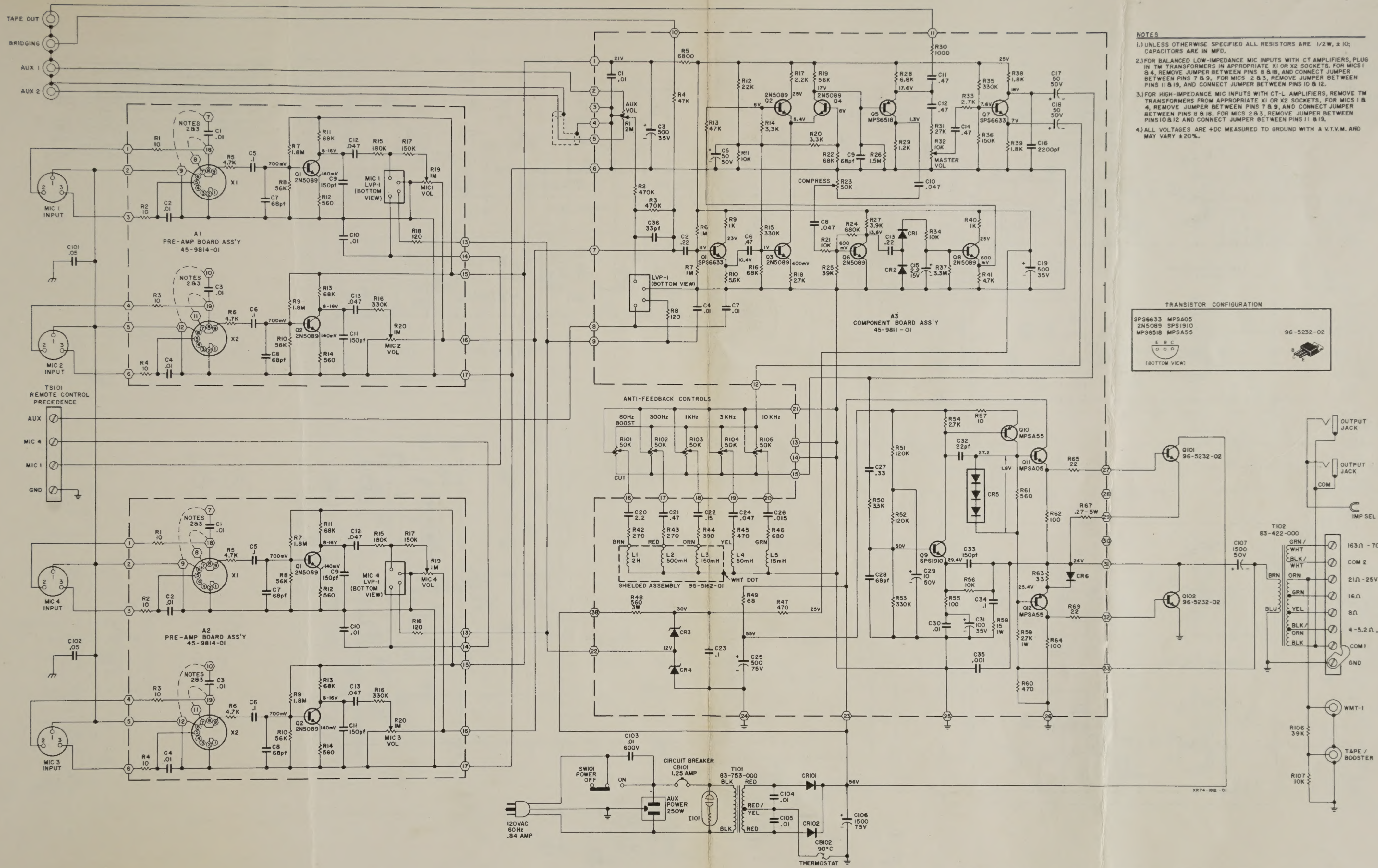
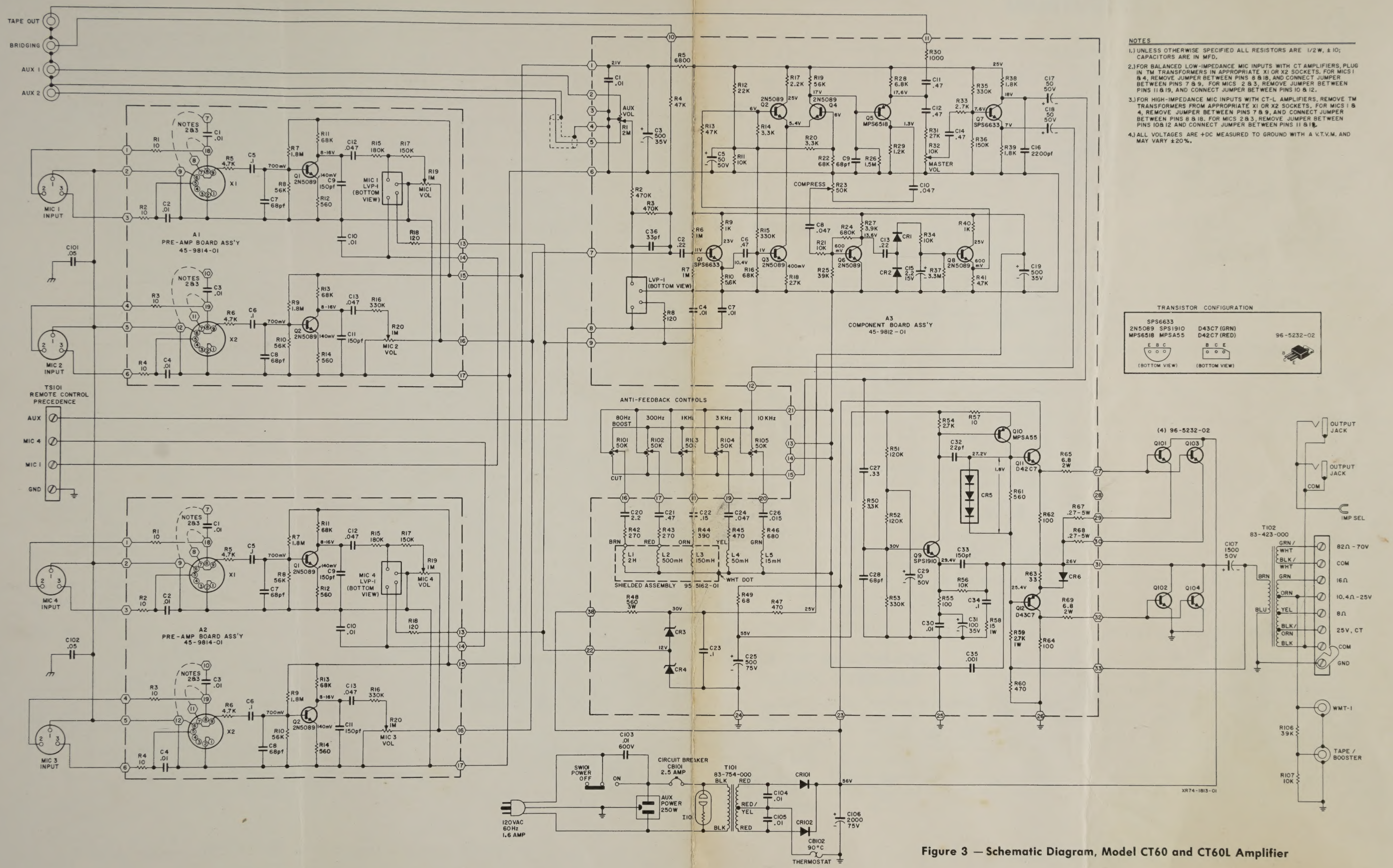


Figure 2 — Schematic Diagram, Model CT30 and CT30L Amplifier



NOTES

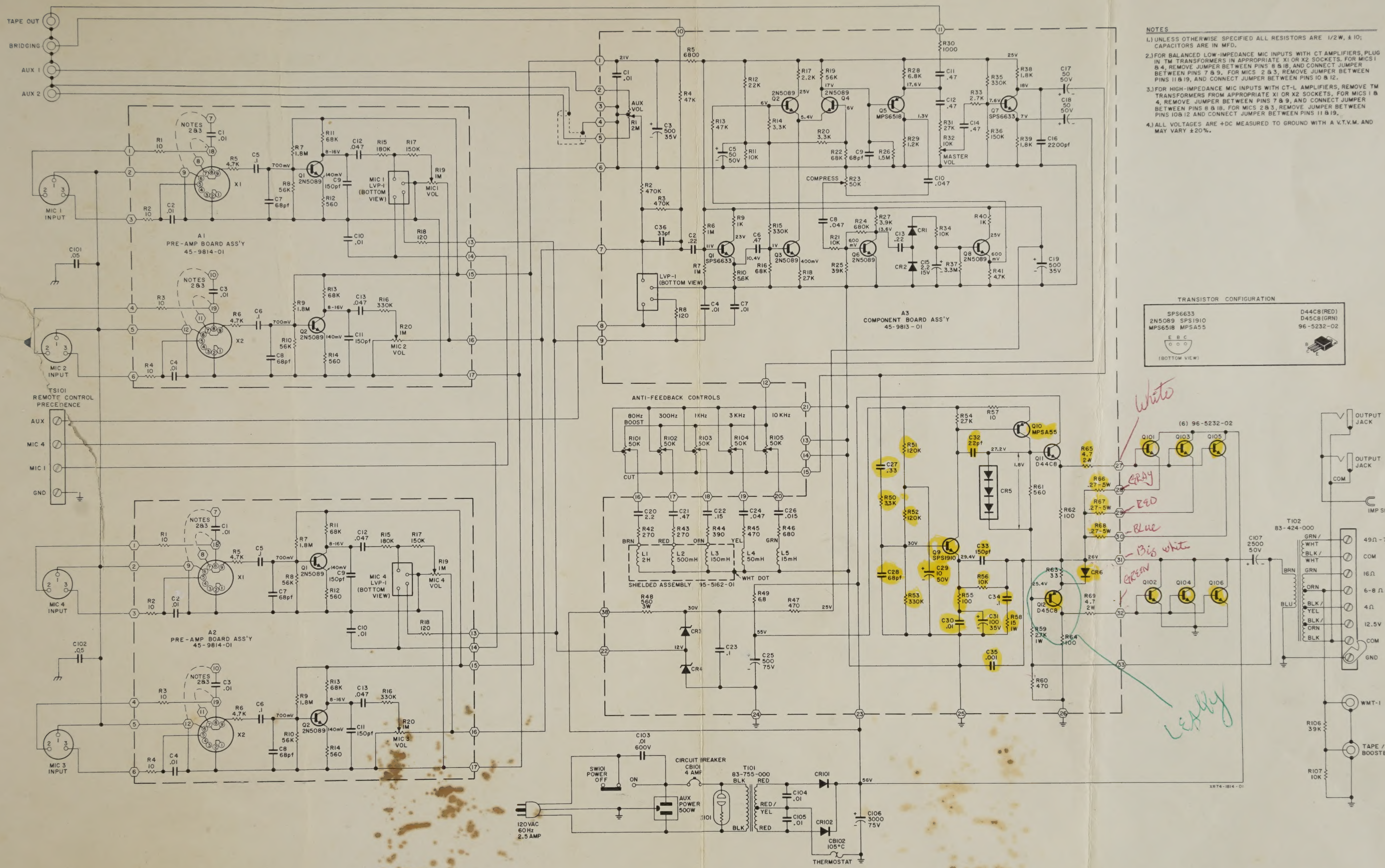
1.) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2W, ± 10; CAPACITORS ARE IN MFD.

2.) FOR BALANCED LOW-IMPEDANCE MIC INPUTS WITH CT AMPLIFIERS, PLUG IN TM TRANSFORMERS IN APPROPRIATE X1 OR X2 SOCKETS. FOR MICS 1 & 4, REMOVE JUMPER BETWEEN PINS 8 & 18, AND CONNECT JUMPER BETWEEN PINS 7 & 9. FOR MICS 2 & 3, REMOVE JUMPER BETWEEN PINS 11 & 19, AND CONNECT JUMPER BETWEEN PINS 10 & 12.

3.) FOR HIGH-IMPEDANCE MIC INPUTS WITH CT-L AMPLIFIERS, REMOVE TM TRANSFORMERS FROM APPROPRIATE X1 OR X2 SOCKETS. FOR MICS 1 & 4, REMOVE JUMPER BETWEEN PINS 7 & 9, AND CONNECT JUMPER BETWEEN PINS 8 & 18. FOR MICS 2 & 3, REMOVE JUMPER BETWEEN PINS 10 & 12 AND CONNECT JUMPER BETWEEN PINS 11 & 19.

4.) ALL VOLTAGES ARE +DC MEASURED TO GROUND WITH A V.T.V.M. AND MAY VARY ±20%.

Figure 3 — Schematic Diagram, Model CT60 and CT60L Amplifier



NOTES

1.) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2W, ± 10; CAPACITORS ARE IN MFD.

2.) FOR BALANCED LOW-IMPEDANCE MIC INPUTS WITH CT AMPLIFIERS, PLUG IN TM TRANSFORMERS IN APPROPRIATE X1 OR X2 SOCKETS. FOR MICS 1 & 4, REMOVE JUMPER BETWEEN PINS 8 & 18, AND CONNECT JUMPER BETWEEN PINS 7 & 9. FOR MICS 2 & 3, REMOVE JUMPER BETWEEN PINS 11 & 19, AND CONNECT JUMPER BETWEEN PINS 10 & 12.

3.) FOR HIGH-IMPEDANCE MIC INPUTS WITH CT-L AMPLIFIERS, REMOVE TM TRANSFORMERS FROM APPROPRIATE X1 OR X2 SOCKETS. FOR MICS 1 & 4, REMOVE JUMPER BETWEEN PINS 7 & 9, AND CONNECT JUMPER BETWEEN PINS 8 & 18. FOR MICS 2 & 3, REMOVE JUMPER BETWEEN PINS 10 & 12 AND CONNECT JUMPER BETWEEN PINS 11 & 19.

4.) ALL VOLTAGES ARE +DC MEASURED TO GROUND WITH A V.T.V.M. AND MAY VARY ±20%.

Figure 4 — Schematic Diagram, Model CT100 and CT100L Amplifier

NOTES

1.) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2W, ± 10; CAPACITORS ARE IN MFD.

2.) FOR BALANCED LOW-IMPEDANCE MIC INPUTS WITH CT AMPLIFIERS, PLUG IN TM TRANSFORMERS IN APPROPRIATE X1 OR X2 SOCKETS. FOR MICS 1 & 4, REMOVE JUMPER BETWEEN PINS 8 & 18, AND CONNECT JUMPER BETWEEN PINS 7 & 9. FOR MICS 2 & 3, REMOVE JUMPER BETWEEN PINS 11 & 19, AND CONNECT JUMPER BETWEEN PINS 10 & 12.

3.) FOR HIGH-IMPEDANCE MIC INPUTS WITH CT-L AMPLIFIERS, REMOVE TM TRANSFORMERS FROM APPROPRIATE X1 OR X2 SOCKETS. FOR MICS 1 & 4, REMOVE JUMPER BETWEEN PINS 7 & 9, AND CONNECT JUMPER BETWEEN PINS 8 & 18. FOR MICS 2 & 3, REMOVE JUMPER BETWEEN PINS 10 & 12 AND CONNECT JUMPER BETWEEN PINS 11 & 19.

4.) ALL VOLTAGES ARE +DC MEASURED TO GROUND WITH A V.T.V.M. AND MAY VARY ±20%.

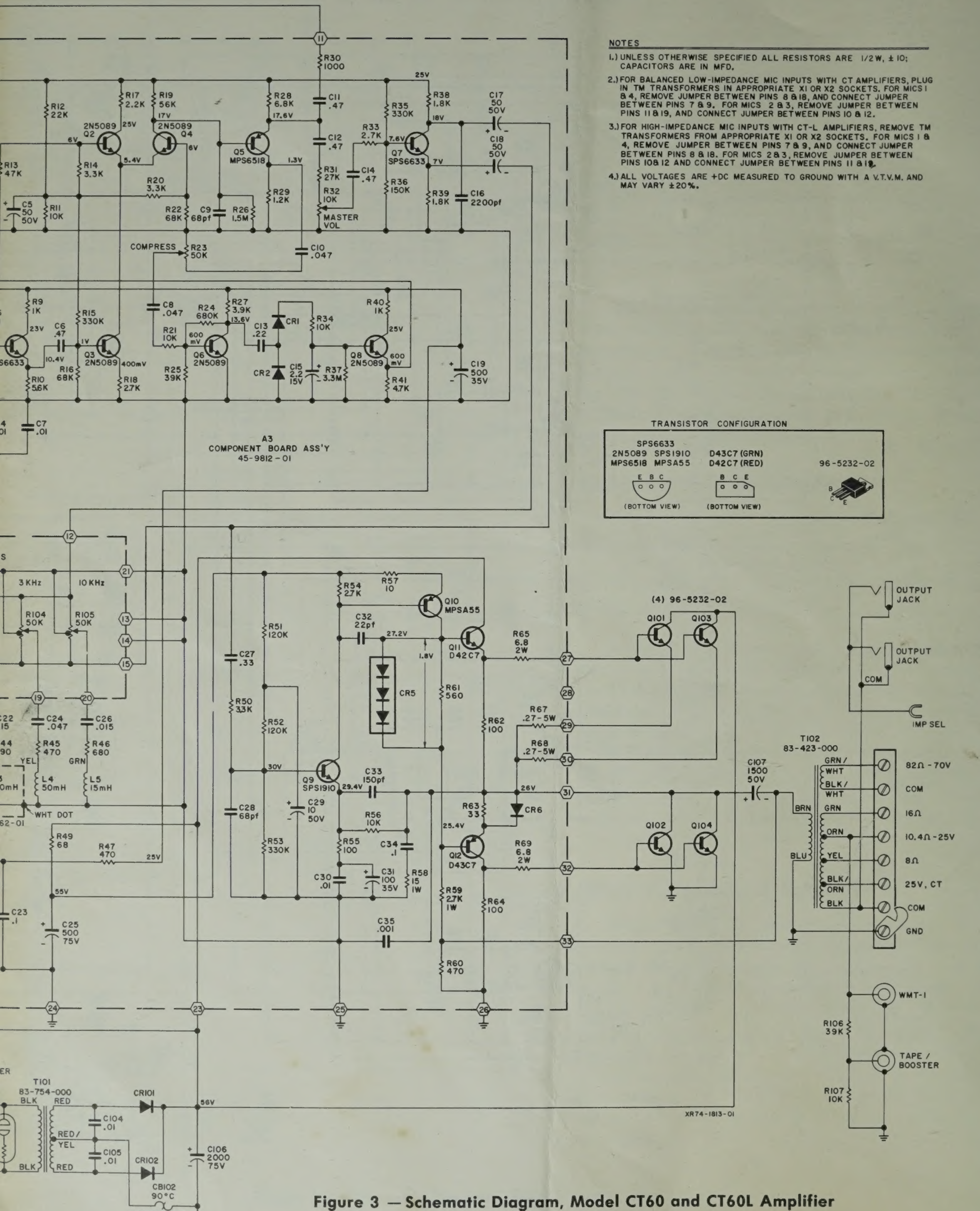


Figure 3 — Schematic Diagram, Model CT60 and CT60L Amplifier

WARRANTY

The Bogen equipment which you have just purchased has been carefully tested and inspected before leaving our factory. When properly installed and operated in accordance with instructions furnished, it should give excellent performance and reliable operation.

Bogen Division of Lear Siegler, Inc., guarantees this equipment against all defects in material and workmanship for one year from date of sale to the original purchaser, except that this warranty does not extend to vacuum tubes, which are guaranteed for 90 days, nor does it apply to wooden enclosures or to equipment which has been subjected to abuse or accident or altered in any way. Any part of the equipment covered by this warranty which, with normal installation and use, becomes defective will be repaired or replaced by Bogen, provided it is returned for examination prepaid and insured to Bogen Division, Route 4 & Forest Avenue, Paramus, New Jersey, or to an authorized service station. For the address of the nearest service station, write to Bogen Service Department at the aforementioned address.

The registration card enclosed with the equipment must be filled out and mailed to us within five days of purchase to place the warranty in effect.

LEAR SIEGLER, INC.

LSI

BOGEN DIVISION
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PARAMUS, N. J. 07652

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